

ILLUMINATION DEVICE IN A CRYOSTAT

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority of the German patent application 103 18 026.5 filed April 19, 2003 which is incorporated by reference herein.

5 **FIELD OF THE INVENTION**

[0002] The invention concerns a cryostat having a cryostat chamber in which a microtome for cutting frozen specimens is arranged, and in particular an illumination device for the cryostat chamber.

BACKGROUND OF THE INVENTION

10 [0003] Cryostats of this kind are used in order to cut frozen specimens with a microtome for subsequent viewing with a microscope. The specimens to be cut are cooled to a specific predefined temperature, the temperatures generally being between -10°C and -50°C. To ensure temperature invariability, the microtomes are arranged in extensively encapsulated cryostat chambers, and the latter are
15 appropriately cooled.

[0004] To ensure safe operation, the cryostat chambers are illuminated with lamps. This has the disadvantage, however, that these light sources generate heat, thus jeopardizing the temperature invariability that is critical for cutting the specimen.

20 [0005] It has moreover been found that the light sources, whose dimensions are quite large, cannot be effectively cleaned.

SUMMARY OF THE INVENTION

[0006] It is therefore the object of the present invention to improve the illumination of cryostat chambers so as to result in greater temperature
25 invariability inside the chamber.

[0007] This object is achieved, according to the present invention, by way of an illumination device including at least one LED for illuminating the cryostat chamber.

5 [0008] The invention is characterized in that the illumination device comprises as the light source at least one LED, preferably a white-light LED. A compact configuration, very low thermal emission, and good cleaning and disinfection capability are achieved with the LED. In addition, the LEDs can also be very effectively protected against water splashes because of their physical shape.

10 [0009] In an embodiment of the invention, multiple LEDs are grouped together into an illumination module, resulting in an increased luminance with a compact configuration. Furthermore, it is thus also very easy to protect the electrical contacts of the LEDs from moisture or water splashes.

15 [0010] In a development of the invention, the illumination module comprises a housing having a plug connector for supplying power. The result of this is that the illumination module can be arranged replaceably, by way of the plug connector, in the cryostat chamber. Single or multiple illumination modules can thus be replaceably arranged, as needed, in prepared plug-in receptacles in the cryostat chamber.

20 [0011] In a further embodiment of the invention, multiple illumination modules are electrically connected to a common power supply system. This power supply system is preferably arranged outside the cryostat chamber, so that not only minimized complexity but also reduced heat evolution is implemented here.

25 [0012] In a development of the invention, a circuit arrangement is provided for switching single and/or multiple illumination modules on and off. Single regions inside the cryostat chamber can thus be illuminated depending on the application.

30 [0013] In an advantageous development, the circuit arrangement additionally has the function of a dimmer for single and/or multiple illumination modules. This likewise makes possible individual illumination of the cryostat chamber

[0014] In a development of the invention, a switch is arranged on the cryostat and is electrically connected to the circuit arrangement, the switch automatically switching and/or dimming single and/or multiple illumination modules upon opening and/or closing of the cryostat chamber. The result of this function is that the illuminating light inside the chamber is automatically controlled when the cover or panel is opened by an operator. It is thus possible, for example, always to switch to optimum illumination upon opening, and to switch off or dim single illumination modules upon closing. It seems advisable, for example, to illuminate only the sample holder and/or the cutting knife of the microtome when the cryostat chamber is closed.

[0015] In a further embodiment of the invention, a water-splash protector is associated with at least one LED. Advantageously, the illumination module can be equipped with a seal for encapsulating the electrical LED contacts.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The invention will be explained in more detail on the basis of an exemplary embodiment, referring to the schematic drawings in which:

FIG. 1 is a view of a cryostat formed in accordance with an embodiment of the present invention;

FIG. 2 is a section through an illumination module of the cryostat;

FIG. 3 is a plan view of the illumination module; and

FIG. 4 is a plan view of the cryostat with a cryostat chamber.

DETAILED DESCRIPTION OF THE INVENTION

[0017] FIG. 1 is a view of cryostat 1 having a cryostat chamber 2 in which an illumination device 4, having multiple illumination modules 6, is arranged.

Cryostat chamber 2 can be opened and closed by way of a movable cover 17.

Illumination modules 6 are electrically connected via leads 14 to a circuit arrangement 10, and via lead 15 to a power supply system 9. A switch 11, which detects the opening and closing of cover 17 of cryostat chamber 2, is arranged on

cryostat 1. Switch 11 is likewise connected via a lead (not depicted) to the circuit arrangement 10.

5 [0018] Single illumination modules 6, or even all of them, can be switched and/or dimmed via circuit arrangement 10. By means of switch 11, single and/or multiple illumination modules 6 can be automatically switched and/or dimmed when cover 17 or cryostat chamber 2 is opened or closed.

10 [0019] FIG. 2 is a section through an illumination module 6 having a housing 7 and having single LEDs 5 that are arranged on a circuit board 13. Circuit board 13 and the electrical contacts of LEDs 5 are sealed with respect to external influence by way of a water-splash protector 12 provided in the housing.

[0020] FIG. 3 shows illumination module 6 in a plan view, with a plug connector 8 arranged on the side of housing 7. By way of plug connector 8, illumination module 6 can be mounted in cryostat chamber 2 and simultaneously supplied with power.

15 [0021] FIG. 4 is a plan view of cryostat chamber 2 with the centrally arranged microtome 3 and illumination modules 6 provided around microtome 3. Uniform illumination of all regions inside cryostat 1 is achieved with this arrangement. Also provided in cryostat chamber 2, in addition to microtome 3, is a freezing bar 16 for rapid freezing of specimens and for storing multiple specimen holders. A
20 separate illumination module 6 is arranged for illuminating freezing bar 16.

PARTS LIST

	1	Cryostat
	2	Cryostat chamber
	3	Microtome
25	4	Illumination device
	5	LED
	6	Illumination module
	7	Housing
	8	Plug connector
30	9	Power supply system

- 10 Circuit arrangement
- 11 Switch
- 12 Water-splash protector
- 13 Circuit board
- 5 14 Leads
- 15 Power lead
- 16 Freezing bar
- 17 Cover